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TECHNICAL BACKGROUND AND RESULTS TO DATE

The Bi-Color Technique

1. Bi-color is simply spectrally filtered black and white photography. The only difference between bi-color and normal acquisition is the use of a green filter on one camera. Normally, we use red filters on both forward and aft looking cameras. In the case of bi-color, we use a green filter on one camera and a red filter on the other to provide for spectral discrimination. The green filter need not be used all the time but only on those passes desired, due to the in-flight changeable filter mechanism on the KH-4B camera. Conceptually, then, this technique works as follows:

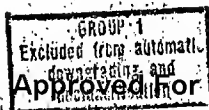
- a. To provide bi-color, the red and green filters are used.

The normal high resolution black and white film, Type 3404, is employed. Even in the bi-color mode this produced typical high resolution stereo coverage.

- b. Dupe positives are made in the normal fashion.

And the photointerpreters can do their normal job.

c. Since spectral separation is provided by the red and green filters, color can be seen if the two records are projected back through the red and green filters, and then superimposed. Although this is not complete color (the blue record is missing), highly realistic color can be produced with some manipulation.



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The records can also be evaluated, as black and whites for spectral differences. This may give clues as to the general composition of objects. The green record may also show objects which the normal red record does not show. The use of the bi-color records, then, is optional depending on the information desired. In summary, they can be used for any task from normal photointerpretation, to the production of "psuedo" color prints.

Results to Date

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2. Bi-color has been tested

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and satellite (Mission 1102) systems. The 1102 test confined itself to [redacted] the major purpose of assessing the use of satellite bi-color and its operational implementation. The highlights were as follows:

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- a. [redacted] were taken with the red and green filters; the film from this acquisition was evaluated.
- b. NPIC evaluated the film (in particular, the green record) to assess its photointerpretation use and quality. We were particularly interested in assessing the impact of the bi-color take on the ability of the photointerpreter to do his normal job. The results of the NPIC evaluation were reported in [redacted]

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"The general conclusion of the photo-interpreters is that the majority of the requirements levied for the KH-4B system could be answered with photography generated in the bi-color mode because when used in stereo, the two records complement each other. In addition, the overall information content of the photography exposed through the green filter is comparable to an average KH-4A mission."

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c. We also had our contractor produce several color prints [redacted] This demonstrated that approximately natural color could be produced. This also demonstrated the problem of registration of the bi-color due to the geometry of the pan cameras. It was determined that orthoprinting was necessary to enable making bi-color prints. To avoid this problem, OSP provided NPIC with an Automatic Registration Electronic Stereoscope (ARES) which allows the photointerpreter to view his normal dupes in color. This equipment rectifies the images and allows NPIC to use the bi-color mode without orthoprinting. Other bi-color equipment is to be provided NPIC in the near future.

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Conclusions/Recommendations

3. The NRO Ad Hoc Committee\* conclusions and recommendations relative to bi-color are summarized as follows:

a. Bi-color can be successfully implemented on the KH-4B system.

b. Insofar as the PI is concerned, there is no loss in ground resolution through the red filter. The loss in the green filter is the equivalent of KH-4B to KH-4A photography. The PI can do his normal job with bi-color acquisition.

c. The intelligence value of bi-color has not been proven. To assess its use, it must be flown against specific intelligence requirements involving operational targets.

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d. The NRO Ad Hoc Committee has concluded  that there is no technical or photointerpreter reason why bi-color cannot be flown operationally if COMIREX so desires. The NRO Committee has concluded that the operational usefulness of bi-color can only be assessed by flying it against specific intelligence questions.

\*NRO Ad Hoc Committee on KH-4B Photographic Experiments

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